Reveo-0141

I CLAIM:

1. A system for acquiring information on the size of a voltage signal, comprising:

a superconducting transmission line, the line having a beginning point;

one or more Josephson Junctions (JJs), wherein the JJs are embedded in the superconducting transmission line, and wherein the JJs are in series at known distances from the beginning point; and

an electron beam, the electron beam impinging on the superconducting transmission line, the electron beam being receptive to displacement along the direction of the superconducting transmission line in proportion to the size of the voltage signal, and wherein the electron beam generates a voltage step on the superconducting transmission line on condition of hitting any one of the one or more JJs.

2. The system of claim 1, further comprising:

N - 1 additional superconducting transmission lines, wherein the N -1 additional superconducting transmission lines arranged adjacently and substantially in parallel with each other and with the superconducting transmission line giving a configuration of N substantially identical superconducting transmission lines, the configuration having two characteristic directions, a y direction, along the direction of the lines, and an x direction, directed across the lines;

a matrix of the embedded JJs over the configuration of the N superconducting transmission lines, the matrix formed by 2^{N-1} of the JJs on each one of the N superconducting transmission lines, wherein the JJs are so placed as to yield N digit binary numbers in the x direction, and furthermore that the N digit binary numbers fall in numerical order in the y direction; and

a scanning voltage deflecting the electron beam in the x direction, wherein the electron beam periodically impinges on each one of the N superconducting transmission lines.

3. The system of claim 2, wherein the superconducting transmission lines are made of a HTC superconductor material.

4. The system of claim 3, further comprising:

a cooling subsystem, the cooling subsystem providing an ambient where the HTC superconductor material conducts current without resistance; and

an electron beam subsystem, the electron beam subsystem further comprising a vacuum system.

5. A method for taking N bit digital samples of a time varying voltage signal, comprising the steps of:

providing N superconducting transmission lines, the N superconducting transmission lines arranged adjacently and substantially in parallel with each other, forming a configuration with two characteristic directions, a y direction, along the direction of the lines, and an x direction, directed across the lines;

imbedding 2^{N-1} Josephson Junctions (JJs) in series on each one of the N superconducting transmission lines, wherein the JJs forming a matrix over the configuration of the N superconducting transmission lines, placing the JJs as to yield N digit binary numbers in the x direction, and furthermore that the N digit binary numbers fall in numerical order in the y direction; and

impinging an electron beam on the arrangement of the N superconducting transmission lines, the electron beam being deflected by a scanning voltage in the x direction, wherein the electron beam periodically impinging on each one of the N superconducting transmission lines, the electron beam also being receptive to displacement along the y direction in proportion to the size of the time varying voltage signal, and wherein the electron beam generating a voltage step on any one of the N superconducting transmission lines on condition of hitting any one of the JJs, whereby the voltage steps on the N lines yield a digital representation of the time varying voltage signal.

6. The method of claim 5, further comprising the step of selecting a HTC superconductor material for fabricating the superconducting transmission lines.